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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 : D21B 1/02, D21C 9/00	A1	(11) International Publication Number: WO 87/ 05954 (43) International Publication Date: 8 October 1987 (08.10.87)

(21) International Application Number: PCT/SE87/00124

(22) International Filing Date: 12 March 1987 (12.03.87)

(31) Priority Application Number: 8601477-6

(32) Priority Date: 2 April 1986 (02.04.86)

(33) Priority Country: SE

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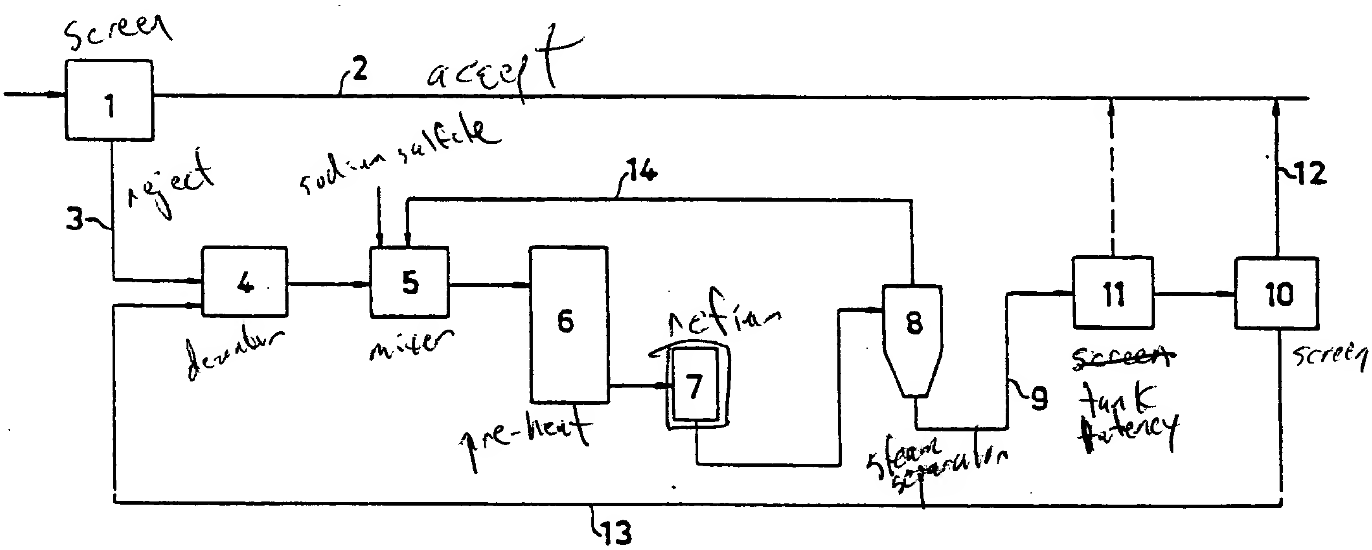
(81) Designated States: AT (European patent), AU, DE (European patent), FI, FR (European patent), GB (European patent), JP, NO, SE (European patent), US.

Published
With international search report.

(54) Title: METHOD OF PROCESSING MECHANICAL PULP



(57) Abstract

The processing comprises screening for dividing the pulp into an accept and a reject fraction, of which the reject fraction constitutes 10-40%. The reject fraction is dewatered, impregnated with sodium sulphite and preheated with steam. Thereafter refining is carried out under pressure and steam development. Only this steam is used for preheating the reject fraction. After the refining, so-called latency-treatment is carried out whereafter the reject fraction is returned to the mechanical pulp, possibly via additional screening.

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Method of processing mechanical pulp

This invention relates to a method of processing mechanical pulp intended for the manufacture of printing paper. The mechanical pulp consists of groundwood pulp or thermo-mechanical pulp (TMP).

Groundwood pulp is manufactured by pressing wood material against a rotating grindstone or grinding disc for exposing the fibres. Owing to the grinding treatment the resulting groundwood contains a relatively great proportion of fibres not entirely defibrated, of shives and more or less torn and cut-off fibres and of fines. The advantages of the groundwood are, besides high wood yield, relatively low energy consumption at the manufacture and high light scattering.

The short mean fibre length of the groundwood and the high content of fines bring about a smooth surface and a high opacity of the paper made of the groundwood. The shives content, however, and the relatively low strength of the groundwood constitute a serious disadvantage.

Thermomechanical pulp is manufactured by preheating wood chips and refining between two opposite refining discs. The resulting pulp contains a relatively low proportion of not defibrated fibres and shives, a high proportion of whole fibres and, compared with groundwood, a low proportion of fines. The thermomechanical pulp has a higher strength than groundwood, but a lower light scattering. The disadvantage of this pulp, especially at the manufacture of printing paper finer than newsprint, such as uncoated paper for rotogravure and coated light-weight papers (LWC), is the high stiffness of the long fibre fraction and the poor flexibility of these fibres.

The present invention relates to a method of processing groundwood and thermomechanical pulp in such a manner, that the aforesaid disadvantages of the high shives content of the groundwood and the stiff fibres of the thermo-mechanical pulp are reduced to such a degree, that an

upgraded mechanical pulp is obtained, i.e. a pulp of higher quality and, consequently, greater usefulness. This is achieved by the series of processing steps defined in the attached claims.

The invention is described in greater detail in the following by way of an embodiment and with reference to the accompanying Figure showing a flow chart for a method according to the invention.

The system according to the embodiment shown comprises a screen 1, which also can consist of a combination of several screens and vortex cleaner. An accept conduit 2 and a reject conduit 3 extend from said screen 1. The reject conduit 3 leads to a dewatering device 4, preferably in the form of a press, and a subsequent mixing device in combination with a compressing screw feeder 5, which also comprises means for a certain mechanical processing of the fibre material. Thereafter a preheater 6 is provided which is connected to a disc refiner 7. This refiner is provided with a refiner casing, which can be pressurized. After the refiner a steam separator 8, preferably a cyclone, is located, to which an outlet conduit 9 for pulp is coupled which is connected to a screen 10 via a tank 11 for so-called latency-removal. From the screen 10 a second accept conduit 12 extends which is connected to the accept conduit 2, and a second reject conduit 13 extending from the screen 10 leads to the dewatering device 4. The steam outlet conduit 14 is connected to the mixing device 5. It is also possible to pass the entire processed reject fraction from the tank 11 directly to the accept conduit 2. The refined reject fraction possibly can be returned to the pulp before the screen 1 or the combination of screens represented in the flow chart by this screen.

The incoming mechanical pulp is divided by screening in the screen 1 into an accept fraction 2 and a reject fraction 3. The screening can be carried out in several steps

in order thereby to increase the shives and long fibre content in the reject. The reject fraction shall constitute 10-40% of the incoming pulp and substantially comprise the entire shives and long fibre content of the pulp.

The reject fraction thereafter is dewatered to a concentration above 30% dry solids content, whereafter it is transferred to the mixing device 5, which preferably consists of a combined mixing and processing device of the kind shown in the International Patent Application PCT/SE85/00441. The mixing device is charged with 10-50 kg, preferably 15-40 kg of sodium sulphite per ton of dry matter. The reject fraction,thus,is impregnated at a high material concentration, and as simultaneously the mechanical processing is carried out the impregnation agent is kneaded into the fibre material. The heating to desired preheating temperature, 105-170°C, preferably 105-135°C, takes place in the mixing device by steam supply. The kneading balances the chemical and temperature profile in the fibre material and simultaneously a certain defibration takes place. The energy input here shall be 35-100 kWh per ton of dry matter.

The pulp is fed from the mixing device 5 into the preheater 6 where the temperature 105-170°C, preferably 105-135°C, is maintained. The staying time shall be 1-30 minutes, preferably 5-10 minutes, so that the impregnation agent admixed in the mixing device 5 is allowed to diffuse into the fibre wall and react.

The material after the preheating is fed into the disc refiner 7 to be refined at overpressure and at a temperature exceeding the temperature in the preheater. The temperature in the inlet to the refiner shall be 105-145°C, preferably 105-135°C. This implies that the feed from the preheater 6 to the refiner 7 in certain cases must be made air-tight. Such a pressure sluice preferably is obtained by a conical screw-feeder, which transfers the material in the form of an air-tight plug. The refining is carried out with an energy charge of 300-1000, preferably

600-900 kWh per ton dry matter to a freeness lower than 250, preferably 150 at maximum.

During the refining steam is developed, by which the refined pulp is blown from the refiner casing of the refiner to a pressure cyclone 8 for separating steam and pulp under pressure. The pulp is discharged through the conduit 9, diluted to 3-5% concentration and passed to a tank for latency-removal, which takes place at 60-80°C while the pulp is being agitated for 30-60 minutes. The pulp is screened in the screen 10, and a second reject fraction is returned through the conduit 13 to the dewatering device 4 while a second accept fraction is passed to the main accept conduit 2. This second reject fraction constitutes 10-30% of the refined reject fraction and contains substantially the residual shives fraction.

The steam from the pressure cyclone 8 is discharged through the conduit 14. This steam is recycled to the mixing device 5 and to the preheater 6 for heating the reject fraction prior to the refining as described above. This steam is sufficient for bringing about the desired heating to 107-170°C. The system hereby is self-supporting in respect of heating steam.

The following Table shows some data from comparative tests with groundwood of pine where
Column I shows data for only one reject fraction of groundwood processed according to the invention,
Column II shows data for the entire groundwood inclusive of the reject fraction according to Column I,
Column III shows data for the reject fraction of groundwood, which only was refined at high concentration,
Column IV shows data for the entire groundwood inclusive of the reject fraction according to Column III.

TABLE

		I	II	III	IV
Na_2SO_2-charge	kg/t	40	-	-	-
Preheating temperature	^oC	125	-	-	-
Preheating time	min	10	-	-	-
Freeness CSF	ml	100	95	100	95
Energy consumption	kWh/t	750	1450	650	1400
Yield	%	95	96	96,5	97
Shives content	%	0,05	0,02	0,5	0,10
Density	kg/m^3	440	420	360	385
Tensile index	Nm/g	52	36	42	32
Burst index	$kPa.m^2/g$	2,8	1,9	2,0	1,3
Light scattering	m^2/kg	57	68	59	70

It appears from the Table, that the shives content could be reduced considerably by the processing according to the invention. The strength properties, furthermore, were improved while the light scattering substantially could be maintained.

As regards thermomechanical pulp, we have found that the shives content could be reduced and the density of the entire pulp, especially of the long fibre fraction, has increased. The number of stiff fibres of the pulp also was reduced without considerably deteriorating the light scattering of the pulp.

The invention, of course, is not restricted to the embodiments shown, but can be varied within the scope of the invention idea.

Claims

1. A method of processing mechanical pulp, which is produced by mechanical disintegration of chemically untreated wood material, c h a r a c t e r i z e d i n that it comprises in combination the steps as follows

a) screening for dividing the pulp into two fractions, accept and reject, so that the reject fraction constitutes 10-40 % and substantially contains the entire shives and long fibre content of the mechanical pulp;

b) dewatering of the reject fraction to a concentration of above 30 %;

c) admixture of 10-50 kg sodium sulphite per ton dry matter in the reject fraction while simultaneously carrying out mechanical treatment and heating with steam to a preheating temperature of 105-170 ^{o} C, preferably 105-135 ^{o} C;

d) maintaining this preheating temperature for 1-30 minutes, preferably 5-10 minutes;

e) feed into a refiner at 105-145 ^{o} C and refining under pressure of the reject fraction with an energy supply of 300-1000 kWh per ton dry matter, whereby steam develops during the refining;

f) separation of the developed steam and use of only this steam for preheating according to item c);

g) so-called latency-treatment of the reject fraction by dilution to 3-5 % pulp concentration and agitation at 60-80 ^{o} C for 30-60 minutes;

h) recycling of the reject fraction to the mechanical pulp.

2. Method as defined in claim 1, c h a r a c t e r i z e d i n that the mechanical pulp consists of groundwood.

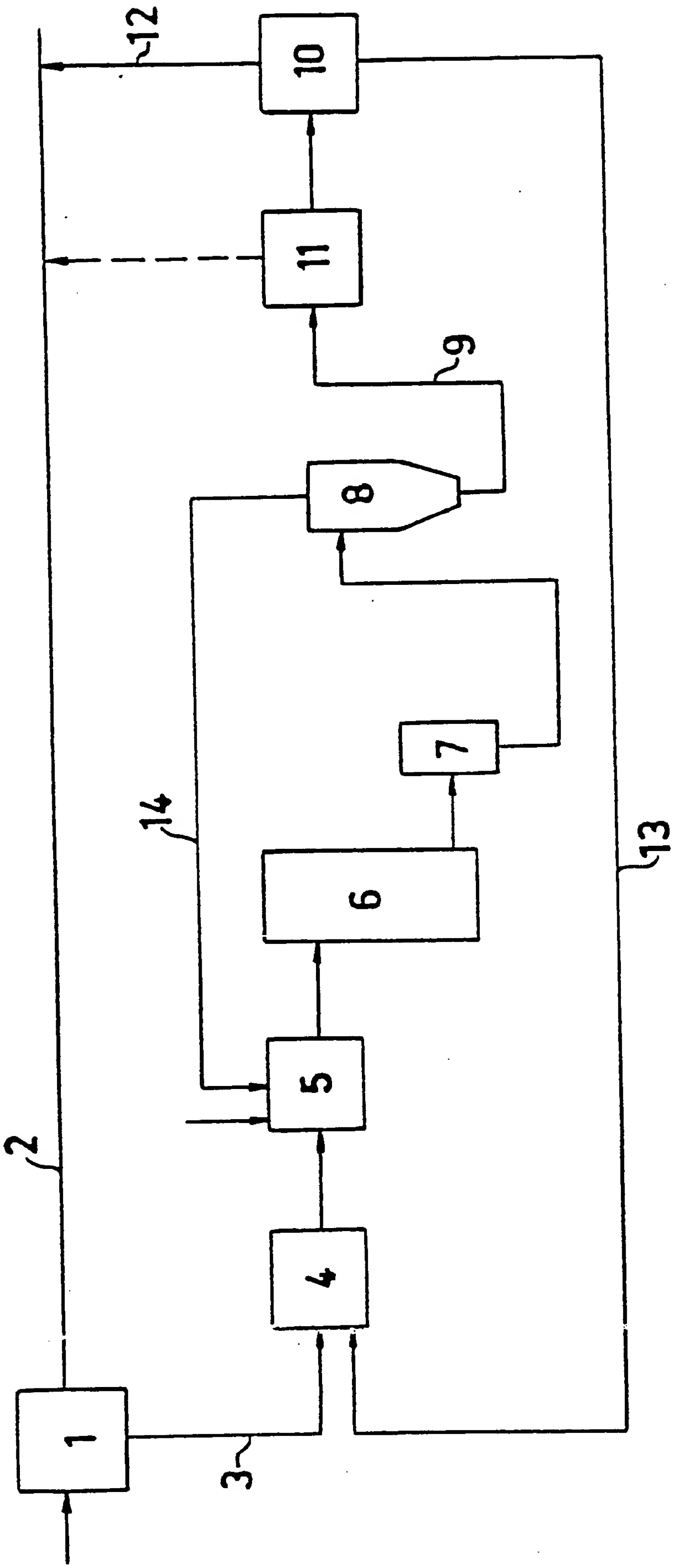
3. Method as defined in claim 1, c h a r a c t e r i z e d i n that the mechanical pulp consists of thermomechanical pulp (TMP).

4. Method as defined in any one of the preceding claims, c h a r a c t e r i z e d i n that the mechanical treatment according to item c) corresponds to an energy charge of 35-100 kWh per ton dry matter.

5. Method as defined in any one of the preceding claims, c h a r a c t e r i z e d i n that the pressure and temperature at

the feed into the refiner and, respectively, the pressure and temperature in the preheater are kept separated by a continuously advanced plug of the material.

6. Method as defined in any one of the preceding claims, c h a r a c t e r i z e d i n that the refined reject fraction according to item e) is divided by screening into a second accept fraction and a second reject fraction, so that this second reject fraction constitutes 10-30 % and to a large extent contains the residual shives fraction of the refined reject fraktion, and this second reject fraction is returned to the dewatering step according to item b) for repeated treatment, and that the second accept fraction is combined with the accept fraction of the mechanical pulp.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